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| EXAMINER |
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CHEN, KEATH T

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1712

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06/25/2010

PAPER

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

|                              |                                      |                                  |  |
|------------------------------|--------------------------------------|----------------------------------|--|
| <b>Office Action Summary</b> | <b>Application No.</b><br>10/757,302 | <b>Applicant(s)</b><br>HE ET AL. |  |
|                              | <b>Examiner</b><br>KEATH T. CHEN     | <b>Art Unit</b><br>1712          |  |

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

#### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

#### Status

- 1) ☒ Responsive to communication(s) filed on 19 May 2010.
- 2a) ☐ This action is **FINAL**.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

#### Disposition of Claims

- 4) ☒ Claim(s) 1-3,6 and 8-20 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-3,6 and 8-20 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

#### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

#### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All    b) ☐ Some \*    c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

#### Attachment(s)

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)                                | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftperson's Patent Drawing Review (PTO-948)                        | 5) <input type="checkbox"/> Notice of Informal Patent Application                       |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)<br>Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____  |

## **DETAILED ACTION**

### ***Continued Examination Under 37 CFR 1.114***

A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 05/19/2010 has been entered.

### ***Response to Amendment***

1. Applicants' replacement drawings, filed on 05/19/2010, is entered. The claim amendment filed on 05/19/2010, addressing claims 1-3 and 5-20 rejection from the final office action (03/18/2010) by amending claims 1-3, 6, and 8-20 and cancelling claims 5 and 7 is entered, and will be addressed below.

### ***Claim Rejections - 35 USC § 103***

The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

**2. Claims 1-3 and 12 are rejected under 35 U.S.C. 103(a) as being unpatentable over Wu et al. (US 6045671, hereafter '671), in view of Anders (US 20020000779, hereafter '779).**

'671 teaches some limitations of:

Claim 1: A combinatorial sputtering system (Fig. 14, col. 25, lines 23-24, the claimed "system for providing a plurality of different combinatorial materials") for

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deposition (col. 25, line 29) is capable of depositing catalyst (see also col. 31, lines 10-11, the claimed "catalyst materials"), the array can be screened for resulting materials having useful properties (col. 6, lines 6-7, the claimed "for evaluation"), thin-film deposition techniques may include sputtering technique, electron beam or thermal evaporation, ... (col. 19, lines 39-51, these are known physical vapor deposition), a processing chamber 256 under vacuum (col. 22, lines 45-46, Fig. 12 clearly applicable to Fig. 14, the claimed "sealable deposition chamber"), a substrate load-lock chamber 262 (col. 22, line 50, the claimed "a load lock chamber for receiving sample assemblies to be processed"), eight RF magnetron sputtering guns 110 ... inserted from the side of the reaction chamber in a complete circle (col. 25, lines 24-27, the claimed "the deposition chamber including a plurality of separately controllable plasma sources radially disposed about a central location within the deposition chamber such that the plasma directed from the source may be focused upon the central location", note that deposition aiming toward the central location is considered a "focused" deposition), components are delivered ... **simultaneously** ... the **power** of two electron beam sources can be varied so that component A is delivered to the substrate in increasing or decreasing amounts while component B is either delivered in a constant amount or **varied** in the opposite direction of component A. In another example, two or more components are delivered using any of the delivery techniques described herein (col. 18, lines 28-38, further underlines the claimed "**separately controllable** plasma sources"), the substrate is attached to a shaft (col. 25, lines 27-28, the claimed "a substrate disposed upon a shaft", Fig. 14 shows the shaft is "vertically positioned at the

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central location of the deposition chamber around which shaft (the substrate) may axially rotate”), masking pattern 134 (col. 25, line 33, see Fig. 14 for four discrete separated areas, the claimed “having a plurality of discrete separated sample assembly areas to which the plasma is directed”), film thickness and uniformity can be controlled by the spraying time (col. 28, lines 25-28, along with previously cited col. 18, lines 28-38, is the claimed “wherein the deposition of plasma of a predetermined type and in a predetermined amount upon each selected sample assembly by each plasma gun is individually controlled by varying an amount of power and an amount of time of deposition for the type of material on a selected area for each gun”), the substrate is attached to a shaft 130 having linear and rotational motion (col. 25, lines 27-28, the claimed “the substrate being controllably positionable within the deposition chamber such that a first sample assembly upon the substrate may be positioned in accordance with a selection from a matrix of z, x coordinates that define the location of the sample assembly, wherein, z defines axial rotation coordinates that align the sample assembly on the substrate with one of the plasma gun clusters, x defines vertical coordinates that align the same sample assembly with the same one of the plasma gun clusters”, the apparatus is capable of “each such alignment occurring when the plasma gun clusters are sequentially focused upon each sample assembly as the substrate rotates to a fixed radial position around the central axis”), system 250 ... includes a processor (col. 22, lines 66-67) film thickness and uniformity can be controlled by the spraying time, substrate-nozzle distance, ... and/or positioning the spray gun, spray nozzle or substrate, etc. (col. 28, lines 25-28, the claimed “power, time and material type of the

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plasma deposition from each source”), the components can be delivered to predefined regions on the substrate ...sequentially (col. 30, lines 44-46, the claimed “for each selected area when the plasma source and the substrate are sequentially aligned”).

‘671 further teaches that the substrate as large as 100 m<sup>2</sup> (col. 7, lines 50-51).

Fig. 14 of ‘671 teaches a shaft 130 having linear and rotational motion (col. 25, lines 27-28) with one dimension linear motion, does not explicitly teaches the linear motion in both x and y direction, therefore, does not explicitly teaches the other limitations of:

Claim 1: (1A) each of the plurality of separately controllable plasma sources comprising a cluster of plasma guns each gun connected to a certain deposition material type to be deposited and oriented with respect to the central location such that each gun in the cluster may be focused upon a selected sample assembly in the central location; (1B) (substrate being controllably positionable within the chamber ... with a selection from a matrix of z, x) and y coordinates; the substrate are sequentially aligned according to the z, x, y coordinates of the matrix.

‘779 is an analogous art in the field of glow discharge plasma sources (title) for sputtering ([0032]). ‘779 teaches several plasma sources mounted in parallel with contamination below detection limit (abstract) a quasi-linear constricted glow discharge plasma source 158 ... by using several individual constricted glow discharge plasma source cells 160 which are closely aligned in a row, for the advantage of that large

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substrate areas can be homogeneously treated with the outwardly streaming plasma by using a one-dimensional motion of the substrate ([0097], second last sentence).

At the time of the invention was made, it would have been obvious to a person having ordinary skill in the art to have replaced each of the sputtering guns 110 in Fig. 14 of '671 with the sputtering quasi-liner constricted glow discharge source 158 (the claimed cluster of plasma guns and the limitation of claim of 1A) of '779, for the purpose of treating large area substrate, as taught by '779 ([0097], second last sentence), which is applicable to the large substrate of '671 (col. 7, lines 50-51)

In a different embodiment (Fig. 5), '671 teaches the substrate may also be **translated** relative to the frame 206 so that shutter masks 202, 203 may be positioned at selected regions on the substrate (col. 17, lines 44-46) instead of by moving the X--X and Y--Y shutter masks 202, 203 (col. 17, lines 40-41) and/or forming the two dimension pattern of Figs. 2-4. Therefore, needs a two dimensional motion mechanism.

At the time of the invention was made, it would have been obvious to a person having ordinary skill in the art to have added a two dimension motion mechanism (the limitations of 1B), as taught by Fig. 5 of '671, to the combined apparatus of '671 and '779, for the purpose of forming two dimensional pattern in Figs. 2-4 of '671.

'671 further teaches the limitations of:

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Claim 2: system 250 ... includes a processor (col. 22, lines 66-67, processor has programmable parameters, or obviously to programmed to control the following operation), the components can be delivered to predefined regions on the substrate ...sequentially (col. 30, lines 44-46, the claimed “controlling the plasma sources comprises inputting parameters”), the power of two electron beam sources can be varied ... in another example, two or more components are delivered using any of the delivery techniques described herein (col. 18. lines 31-37, the claimed “determined for the selected area specified flux of plasma, the parameters comprising the amount of power”), this system ... provides spatial variation of gas mixture and gas exposure time over the substrate (col. 31, lines 1-3, the claimed “the amount of time, and the characteristics of the material type to be deposited by the plasma source upon the selected area of the substrate”).

Claim 3 (besides the limitations of claim 2): the resulting array of materials on the substrate is in the form of discrete regions comprised of layers ... (the claimed “such that the area comprises multiple layers of materials”).

Claim 12: components of target materials can be selectively deposited onto the substrate 356 sequentially or simultaneously as a mixture of two or more target materials (col. 28, lines 10-12, the claimed “the plasma sources are controlled such that the materials originating from the sources are deposited upon a selected area of the substrate in either 1) a sequential layer deposition and 2) a co-deposition”).



**3. Claims 6, 8-9, and 15-17 are rejected under 35 U.S.C. 103(a) as being unpatentable over '671 and '779, in view of Corderman et al. (US 6491967, hereafter '967).**

'671 and '779, together, teach all limitations of claim 1, as discussed above.

The embodiment in Fig. 14 of '671 teaches eight RF magnetron sputtering guns 110 ... inserted from the side of the reaction chamber in a complete circle (col. 25, lines 24-27, the claimed the substrate ... "is centrally positioned within the chamber"), the substrate is attached to a shaft 130 having linear and rotational motion (col. 25, lines 27-28, the claimed "the substrate being moveable", "such that each separately defined area upon the surface of the substrate may be positioned" and "in alignment with the focus of a plasma source". Fig. 14 of '671 does not teach "multiple separately defined circular areas, each separately defined circular area upon the surface of the substrate may be positioned by control means for the x-y table alignment with the focus of a plasma source" of claim 6.

Fig. 5 of '671 teaches the **substrate** may also be **translated** relative to the frame 206 so that shutter masks 202, 203 may be positioned at selected regions on the substrate (col. 17, lines 44-46) instead of by moving the X--X and Y--Y shutter masks 202, 203 (col. 17, lines 40-41), therefore, teaches a x-y table that moves the substrate.

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In Figs. 1-2, yet another different embodiment, of '671 further teaches: opening in the mask ... are circular (col. 12, lines 44-50, the claimed "the substrate includes multiple separately defined circular areas").

'967 is an analogous art in the field of plasma spray (title) in combinatorial high throughput screening (abstract). '967 teaches a robot arm (the claimed program controlled) that either with 6-axis robot or a 2 axis x-y manipulator can also be used (Fig. 1, col. 3, line 66 to col. 4, line 3, the claimed program controlled x-y table and control means for the x-y table).

At the time of the invention was made, it would have been obvious to a person having ordinary skill in the art to have adopted the multiple separately defined circular areas pattern, as taught in Figs. 1-2 (col. 12, lines 44-50) of '671, and the **translation** of the substrate, instead of translation of mask, as required by '671 (col. 17, lines 40-46), particularly to have replaced the shaft 130 in Fig. 14 of '671 with the robot arm, as taught by '967, because its commonly known and suitability. The selection of something based on its known suitability for its intended use has been held to support a *prima facie* case of obviousness. MPEP 2144.07.

In view of the circular area pattern (col. 12, lines 44-50), Figs. 1-2 of '671 also teaches the "the multiple separately defined selected circular areas of the substrate are arranged in the matrix defined by columns and rows" of claim 8 and "the relationship of

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the number (N) of separately defined circular areas in the rows and a number of separately defined circular areas in the columns is  $rows_N = columns_N$ ” of claim 9.

‘671 further teaches a system 250 ... includes a processor (col. 22, lines 66-67, the claimed “programming”) film thickness and uniformity can be controlled by the spraying time, substrate-nozzle distance, ... and/or positioning the spray gun, spray nozzle or substrate, etc. (col. 28, lines 25-28, the claimed “selecting ... 1) an ion emitted by each plasma source within a cluster; 2) the amount of power and the duration of operation for the source” of claim 15).

Alternatively, the above combination would also have had the limitations of: a robot arm (imported from ‘967, the claimed “programming”), while film thickness and uniformity can be controlled by the ... positioning the substrate, etc. (col. 28, lines 25-28, the claimed “the position of the substrate such that a selected area of the substrate is exposed to the plasma source at the selected power and at the selected duration” of claim 15).

‘671 teaches components are delivered ... **simultaneously** ... the power of two electron beam sources can be varied so that component A is delivered to the substrate in increasing or decreasing amounts while component B is either delivered in a constant amount or varied in the opposite direction of component A. In another example, two or more components are delivered using any of the delivery techniques described herein

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(col. 18, lines 28-38, the claimed “selecting plasma sources<sub>u</sub> and controlling the amount of power and the duration of operation of the source includes controlling the sources in the same operation such that plasma materials from the sources are **co-deposited** with respect to the selected area on the surface of the substrate” of claim 16).

‘671 also teaches the components can be delivered to predefined regions on the substrate ...**sequentially** (col. 30, lines 44-46, the claimed “selecting plasma sources<sub>u</sub> and controlling the amount of power and the duration of operation of the sources<sub>u</sub> includes controlling the sources in the same operation such that plasma materials from the sources are deposited as layers with respect to the selected area on the surface of the substrate” of claim 17).

**4. Claims 10-11, 13, and 18-20 are rejected under 35 U.S.C. 103(a) as being unpatentable over ‘671, ‘779, and ‘967, further in view of Chiang et al. (US 7544574, hereafter ‘574).**

‘671, ‘779, and ‘967, together, teach all limitations of claims 8 and 15, as discussed above. ‘671, ‘779, and ‘967, together, do not teach the limitations of: “the relationship of the number (N) of separately defined circular areas in one column to the number of separately defined circular areas in an adjacent column is areas in column<sub>N</sub> = N and areas in adjacent column<sub>N+1</sub> = N+1” of claim 10 nor “the relationship of the number of separately defined circular areas in one row to the number of separately defined areas in an adjacent row is: areas in row<sub>N</sub> = N and areas in adjacent row<sub>N-1</sub> = N-1” of claim 11.

'574 is an analogous art in the field of systems for discretized, combinatorial processing of regions of a substrate (abstract) in thin film processing (field of the invention) such as plasma sputtering (col. 16, lines 55-56). '574 teaches the processing cell have a **circular** shape ... the parallel processing structure, which may be a plurality of separate cells, or a plurality of cells in a single structure, is configured such that every other region 903 is processed with the edge of the processing cells contacting only the corners of the regions to be processed (Figs. 9B-C, and 9E, col. 23, line 62 to col. 24, line 2, the claimed "column<sub>N</sub> = N and areas in adjacent column<sub>N+1</sub> = N+1" of claim 10 and "column<sub>N</sub> = N and areas in adjacent column<sub>N+1</sub> = N-1" of claim 11).

At the time of the invention was made, it would have been obvious to a person having ordinary skill in the art to have replaced the arrangement of array on a substrate as shown in Figs. 1-4 of '671 with the arrangement of the plurality of circular processing cell as shown in Figs. 9B-C and 9E of '574, for the purpose of suitable cell arrangement. The selection of something based on its known suitability for its intended use has been held to support a *prima facie* case of obviousness. MPEP 2144.07.

'574 further teaches the substrate may contain depressed regions on which combinatorial processes take place (col. 13, lines 48-50, see also Fig. 1C, lower right, the claimed "the substrate comprises a side surface of a block positioned within the central location of the chamber, the block having a multiplicity of cylindrical substrate

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elements extending from the side surface thereof, each cylindrical substrate element individually defining a selected area, the cylindrical substrate elements maintained in an array of columns and rows formed within the block, in which the upper surfaces of the cylindrical substrate elements comprise the discrete areas exposed to the sources” of claim 13.

Claims 18-20 are rejected for substantially the same reasons as claims 15-17 rejection, respectively, as discussed above.

**5. Claim 14 is rejected under 35 U.S.C. 103(a) as being unpatentable over ‘671, ‘779, ‘967, and ‘574, further in view of Wang et al. (US 20050035002, hereafter ‘002).**

‘671, ‘779, ‘967, and ‘574, together, teach all limitations of claim 13, as discussed above. ‘574's Fig. 1C also show the limitations of “the cylindrical substrate elements are inset within the block in a matrix” of claim 14.

‘671, ‘779, ‘967, and ‘574, together, do not teach the limitations of: “a plate having a plate matrix of openings concentric with the matrix of elements in the block is applied facing the surface of the block, such that the openings in the plate are aligned with the elements and a cross-section area of an opening in the plate is less than a cross-section area of the surface of the corresponding concentric cylindrical element” of claim 14.

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'002 is an analogous art in the field of electric screening system (title) in the detachable electrode arrangement provides an electrode array for combinatorial synthesis ([0067], second last sentence) applicable to physical vapor deposition PVD ([0062], second sentence). '002 teaches a holder 170 includes a holder block 171 and a back plate 180 which holds RDE 20 in place ([0068], see also [0066]), a holder block 171 (Fig. 15 and 16, [0070], the claimed plate) with the openings 172 sized to be slightly smaller than the outside diameter of electrodes 20 for light press fitting of the electrodes 20 to the holder block 171 ([0070], second last sentence, note 20 corresponds to the claimed inset).

At the time of the invention was made, it would have been obvious to a person having ordinary skill in the art to have adopted the holder arrangement including a holder block/plate with opening smaller than the electrodes/inset, as taught by '002, in the combined apparatus of '671, '967, and '574, for its suitable use as a holder for the combinatorial synthesis in the PVD system. The selection of something based on its known suitability for its intended use has been held to support a *prima facie* case of obviousness. MPEP 2144.07.

### ***Response to Arguments***

Applicant's arguments filed 05/19/2010 have been fully considered but they are unconvincing in light of the new ground of rejection above.

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6. In regarding to Wu '671, Applicants argue that '671 may disclose varying the power of two electron beam sources, the power is not individually controlled for each gun, see the third paragraph of remark.

This argument is found not persuasive.

Besides the control of power and exposure time as discussed above, '671 clearly teaches the two power sources are independently varied:

the **power** of two electron beam sources can be **varied** (col. 18, lines 31-32) so that component A is delivered to the substrate in increasing or decreasing amounts while component B is either delivered in a constant amount or **varied** in the opposite direction of component A. In another example, two or more components are delivered using any of the delivery techniques described herein (col. 18, lines 32-38).

### ***Conclusion***

Any inquiry concerning this communication or earlier communications from the examiner should be directed to KEATH T. CHEN whose telephone number is (571)270-1870. The examiner can normally be reached on 6:30AM-3 PM EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Michael Cleveland can be reached on 571-272-1418. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.



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/KEATH T CHEN/  
Examiner, Art Unit 1712